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ABSTRACT

By the very nature of a comprehensive community college, a faculty member must be able to handle diverse instructional settings, i.e., teaching the math major, the vocational student for whom math is a requirement, and the developmental/remedial student. To do this effectively requires adequate pre-service and in-service educational opportunities. While at present 80% of all two-year math teachers hold a Master's Degree (MA) in math, this should be a minimum requirement. However, a traditional MA program might not be as appropriate as a program designed for two-year college teachers, which would (1) provide broad training in math; (2) investigate the role of math in society; (3) examine current issues in two-year college math instruction; (4) investigate theories of learning as they relate to math; (5) examine specific methodologies; and (6) investigate the use of math in other disciplines. The other essential in maximizing teacher performance is formal and informal options for professional development. Instructors tend to be dissatisfied with post-graduate programs and to feel that there are too few opportunities of an informal nature and a lack of programs that are appropriate to the needs of two-year college math teachers. Short courses, summer programs, regional and local seminars, and department seminars might be used to revitalize teachers' math interest and allow discussion of common issues and problems. (AYC)

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Qualifications of The Two Year College Mathematics Teacher: What are they, What Should They Be?

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Before I make some comments about the education of the two-year college mathematics teacher, it might be appropriate for me to tell you how I got here.

Back in the late Spring of 1976 I noticed that the American Mathematical Association of Two-Year Colleges was having its Third Annual Meeting in San Francisco the following October. Like most colleges, the travel budget at ECC was rather minimal, so I asked to present a small mathematical paper on a topic that interests me and one that I felt might interest others.

Well, to make a long story short, I did attend the meeting. I really enjoyed it. The people attending seemed to be interested in topics that interested me also, topics that pertain to teaching mathematics at the two-year college level.

Upon my return, I sent a letter to Joe Cicero, who had been installed as President of AMATYC at the convention. I mentioned how much I enjoyed the meeting and the people attending. I also suggested that it might be reasonable to have some kind of Panel Discussion on Graduate Programs for the TYC teacher at the next meeting. The idea was to invite a number of representatives from graduate schools that had programs specifically aimed at the TYC teacher.

Now I don't know how many of you know Joe Cicero, but he's a person who's going some place. The reason I say that is because he has a quality that every successful executive needs. He not only agreed that the Panel Discussion was a good idea; he also asked me to organize it which was o.k., but furthermore, he asked me to be chairman of AMATYC's Committee on Education, which he was contemplating establishing because he felt that the educational needs of the tyc math teacher should be addressed.

So, there I was with two tasks ahead of me: organizing a panel discussion, and chairing a committee which had just been established. Some time in March or April of 1977, Phil Cheifetz who was, at the time, President Elect of AMATYC, gave me a call. He had been contacted by Jesse Rudnick who was in charge of the two-year college part of this meeting and Dr. Rudnick asked Phil to suggest some speakers. Phil reasoned that it would be a good idea for chairmen of AMATYC committees to make presentations. I don't know how many of you are familiar with April in Newark, but it took me about 4 1/2 seconds to decide yes I'll do it! So here I am.

Now that you know how I got here, let me tell you what I'm going to talk about. A more appropriate subject of this presentation would be "The Education of the Two-Year College Teacher: What should it Be." I'm certainly not pompous enough to tell you what it should be. Rather, what I'll try to do is to mention some of the issues, as I see them, that pertain to the educational training of the TYC teacher of mathematics.

In particular, I'll try to focus on the following topics:

1. Minimal requirements for the tyc teacher of mathematics.
2. Continuing Educational needs of the two-year college teacher of mathematics.

The reason that I've chosen to focus on these topics is twofold:

1. I don't think either topic has been addressed adequately.
2. I feel that if the tyc teacher of mathematics is going to view himself, or herself, as a professional, then this group needs to do what every profession does. Set its own standards.

Now I should point out that in most of the remarks I make, the opinions expressed are, by and large, mine. I am not necessarily giving the opinions of AMATYC or any other group.

In order to discuss the TYC teacher's educational needs we ought tc ask ourselves what the typical two-year college teacher does. That in itself is not an easy task. Two-year colleges are known to vary in outlook and purpose from region to region, state to state and even within a given state. A "typical" community college may attempt to serve any or all of the following groups: the transfer student, the "technical" student and the "remedial" or "developmental" student. Within the transfer student category would be both "math major type" students (unfortunately this group seems to be constantly diminishing in number) and "service type" students, i.e. students whose curricula require some sort of mathematics. I suppose what I'm trying to say is that by the very nature of a comprehensive communtiy college, a faculty member in such an institution must be able to handle diverse and varied instructional settings.

Let's look a little more closely, and with more authority, at the "typical" two-year college teacher of mathematics and his teaching environment. We can do this by referring to a 1976 report issued by the Conference Board on Mathematical Sciences: "Undergraduate Mathematical Sciences in Universities, Four-Year Colleges and Two-Year Colleges."

First of all, in a sense the Two-Year College is "where the action is." While enrollments in higher education have tailed off or declined in recent years, enrollments at the two-year college have grown substantially. In the last 20 years or so enrollments have increased by

600% at the TYC. Moreover at the time of the report, close to 40% of all undergraduate mathematics enrollments occurred at the two-year college. Coincident with this increased activity in mathematics instruction by the two-year college, is a redistribution of the type of courses in which enrollment occurred. Previously, (1970 or earlier), overall mathematics enrollment was divided nearly evenly between "Math below calculus" and "calculus or above." Today, the distribution is skewed much more heavily towards the "below calculus" part of the scale. On the two-year college level, enrollments in mathematics are distributed as follows:

Service Courses: about 30%
Remedial Courses: about 40%
Pre-Calculus, Calculus and above about 30%.

Thus, the typical two-year college teacher of mathematics must be able to handle a diverse spectrum of educational situations. He, or she, must be able to teach mathematics to students who view mathematics as a tool. He or she, must be able to teach mathematics to students who, for one reason or another, have experienced little or no success in previous mathematical encournters, and finally he, or she, must be able to teach beginning sequential courses, as least as well as his colleague at the four-year college or university.

This brings me to the first main area that I'd like to address: minimal requirements for entering the profession of two-year college mathematics instruction. Let's examine some points which pertain to teaching mathematics at a two year college and therefore have a bearing on minimal training needs.

1) tyc mathematics instruction has these 3 previously mentioned principal target areas;

2) it is not feasible to have specialist in any one of the three areas;

3) at present a full 80% of tyc math faculty hold a Master's degree in math;

4) the outlook for large scale increases in faculty positions is bleak.

In view of these facts, my own feelings about minimal requirements for entering the TYC teaching of mathematics profession are that the Master's degree in math should be a minimal requirement. This Master's degree could and perhaps should be different from the traditional program designed to prepare students for the traditional Ph.D in mathematics. Moreover, the whole question of minimal training needs can be subsumed by the question of training meeds in general. I think there should be programs (formal in nature) that prepare people for tyc teaching of mathematics. Such a program could have as one of its components a Master's degree for a tyc teacher of mathematics.

Now that we have disposed of minimal training, and also opened the question of formal training, let me proceed to discuss issues to which formal programs should be directed.

A formal program should have as its basic objectives:

1) to provide broad training in mathematics;

2) to investigate the role that mathematics plays in the intellectual development of our society;

3) to examine current and salient issues in two-year college mathematics teaching;

4) to investigate theories of learning as they relate to mathematics, especially to adults;

5) to examine specific methodologies;

6) to investigate specifically how mathematics is used in other disciplines especially, the social sciences, management sciences, life sciences, etc.

A formal program such as I am proposing should be flexible and extensive enough to both prepare people for entering the TYC teaching profession and also provide for continued training of present TYC faculty.

Such a program should culminate in the granting of a degree. To my mind the title of the degree is irrelevant. Ph.D., Ed.D., D.A. are all in use at present.

Let's move ahead to the second area that I'd like to talk about; an area that interests me more and also an area for which the need for reform may be more pressing.

This is the area of continuing education for the TYC teacher of mathematics. (Call it advanced training if you like.) As I see it, we can distinguish between two types of programs: formal and informal. We spoke of formal programs just a few moments ago. By a formal program I mean a well-defined program through which a participant can be certified as having attained a certain level of expertise; e.g., a degree-related program. By an informal program I'll be more vague; an informal program is any program that's not formal. I hope to be much more specific as I move along.

A reasonable question to ask at this point is: Is there a need for continuing educational programs? To my mind, the answer is yes. I have nothing definitive--at least not now--to base my answer. I say the answer is yes, based on conversations with TYC math faculty, both in my school and in neighboring and not so neighboring schools. I say

at least not now, because, as you may know a rather in-depth investigation of the advanced training needs of TYC math faculty has recently been conducted. It was conducted under the auspices of the Rocky Mountain Mathematics Consortium with an NSF grant. The importance of this study, as I see it, is that the study assesses the needs for continuing education as perceived by TYC faculty themselves.

I have a feeling that what they will find is the following:

1. For the most part, of a formal nature, continuing education programs fall into either of 2 categories. Traditional Ph.D. programs or School of Education, mathematics education type programs.
2. There is, on the part of TYC faculty, widespread dissatisfaction with each of the type programs mentioned. The traditional, research oriented Ph.D. program is much too specialized for the two year college teacher. On the other hand, many faculty will feel that Ed.D. type programs are weighted too much in pedagogy type courses and not enough in Mathematics.
3. For informal type programs, there probably simply is not enough available. The NSF Summer Institute type programs are virtually non-existent. Short courses, workshops etc. are simply not as available as they should be.
4. I suspect that the study will show that TYC Math faculty feel that there should be appropriate programs, both formal and informal, available.

In effect what I think is the case, and I suspect the study will bear me out, is that the programs that are available are not as appropriate as they could be; and programs that are available simply

are not plentiful enough in supply.

Why is this lack of appropriate programs prevalent. I think there are a number of reasons:

1. The two year college has only recently emerged as a major force on the higher education scene.
2. Graduate schools, because of tradition, bureaucracy or what have you, have been reluctant to deviate from existing programs.
3. While TYC teachers may not be satisfied with existing programs, it is hard to get from TYC teachers a consensus as to what an "ideal" program should be.

What about what I call informal programs? A number of models come to mind.

1. Short courses like the AAAS-NSF Chatauqua type courses. This type of program should be available to a greater extent.
2. Summer programs. Institutes and workshops similar to the former NSF programs should be available.
3. Regional and local programs could be worked out. NYSMATYC has a summer program each year. My state organization used to run one but then funds ran out. I've read about a program for two year colleges in Oklahoma.
5. In my department we started in 1976-77 a department seminar. The seminar meets once a week and faculty give talks on topics that interest them. This program has served as reasonable way of maintaining mathematical interest and also of sharing ideas in teaching mathematics.

I'm sure there are other models that would be of benefit to tyc teachers of mathematics. For all of them the goals are pretty much the same: to revitalize one's mathematical interests; to come together and discuss common issues and problems, to share solutions and, generally, to consider teaching mathematics at the two year colleges.

How can these ideas be put into action? As far as formal programs are concerned, to my mind, the time is ripe for alternative programs in graduate education. Graduate schools are faced with dwindling enrollments in traditional programs. This diminution together with the emergence of the two year college can lead to a recognition of the need for alternative programs for the tyc teacher.

What about informal programs?
My own feeling is there are ways of providing such programs. For example, to my knowledge virtually every state department or bureau of higher education has a staff development requirement for two year colleges. Faculty might lobby to provide support for programs in this area. Certainly governmental and private foundatioos should be interested in such programs.

In any event, if there's one moral to my story it's that there is a need for training the two year college teacher of mathematics. To my mind the method by which these needs should be met and the content and structure of programs designed to meet these needs, should come from the profession itself.

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